IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS
MARSHALL DIVISION

INVENSAS CORPORATION, Plaintiff, v. SAMSUNG ELECTRONICS CO., LTD. and SAMSUNG ELECTRONICS AMERICA, INC., Defendants.	No. 2:17-cv-00670-RWS-RSP **JURY TRIAL DEMANDED**

FIRST AMENDED COMPLAINT

Plaintiff Invensas Corporation ("Invensas" or "Plaintiff") brings this patent infringement action against Defendants Samsung Electronics Co., Ltd. ("SEC") and Samsung Electronics America, Inc. ("SEA") (collectively, "Samsung" or "Defendants") as follows:

NATURE OF THE ACTION

1. This is a civil action for infringement of United States Patent Nos. 6,232,231 ("'231 patent"), 6,849,946 ("'946 patent"), 6,054,336 ("'336 patent"), 6,566,167 ("'167 patent"), and 6,825,554 ("'554 patent") (collectively, the "Asserted Patents") under the patent laws of the United States, 35 U.S.C. § 1 *et seq*.

THE PARTIES

2. Plaintiff Invensas is a Delaware corporation with its principal place of business at 3025 Orchard Parkway, San Jose, California 95134.

3. Defendant SEC is a company organized under the laws of the Republic of Korea with its principal place of business located at 129 Samsung-ro, Maetan-3dong, Yeongtong-gu, Suwon-si, Gyeonggi-do, 443-742 in the Republic of Korea.

4. Defendant SEA is a New York corporation with its principal place of business at 85 Challenger Road, Ridgefield Park, New Jersey 07660. SEA is a wholly-owned subsidiary of SEC. SEA's registered agent, The Corporation Trust Company, is located at Corporation Trust Center, 111 Eighth Avenue, New York, New York, 10011.

5. Defendants SEC and SEA are related entities that work in concert to design, manufacture, import, distribute, and/or sell the infringing devices.

JURISDICTION AND VENUE

6. The Court has subject matter jurisdiction over these claims under 28 U.S.C. §§ 1331 and 1338(a) and the patent laws of the United States, 35 U.S.C. § 1 *et seq.*

7. The Court has personal jurisdiction over each of the Defendants consistent with the requirements of the Due Process Clause of the United States Constitution and the Texas Long Arm Statute. On information and belief, each Defendant has regularly and systematically transacted business in Texas, directly or through subsidiaries or intermediaries, and/or committed acts of patent infringement in Texas as alleged more particularly below. Samsung has also placed infringing products into the stream of commerce by shipping those products into Texas or knowing that the products would be shipped into Texas. In addition, SEA's business operations relating to cellular mobile devices, which are devices accused of infringement in this Action, are conducted primarily at its Texas facilities and (as of February 2015) over 2,000 people worked at SEA's Texas facilities.

8. With respect to Defendant SEC, a Korean company, venue is proper because suits against foreign entities are proper in any judicial district.

9. With respect to Defendant SEA, venue is proper in this district under 28 U.S.C. § 1400(b) because Defendant SEA has a regular and established place of business in this district and has committed acts of infringement in this district. Defendant SEA has a permanent office located at 1301 East Lookout Drive, Richardson, Texas 75082, which is located in Collin County and within this district. Defendant SEA also employs full-time personnel, such as engineers and senior managers in this district, including in Richardson, Texas. On information and belief, Samsung's business operations relating to cellular mobile devices are conducted primarily at its facilities located in Richardson. Defendant SEA has also committed acts of infringement in this district by commercializing, marketing, selling, distributing, and servicing certain Samsung-branded devices, including but not limited to phones and tablets, which are devices Plaintiff accuses of infringement in this Action.

THE ASSERTED PATENTS

10. The '231 patent is entitled "Planarized Semiconductor Interconnect Topography and Method For Polishing a Metal Layer To Form Interconnect," and issued on May 15, 2001, to inventors Anantha R. Sethuraman and Christopher A. Seams. Invensas owns the entire right, title, and interest in and to the '231 patent.

11. The '946 patent is entitled "Planarized Semiconductor Interconnect Topography and Method For Polishing a Metal Layer To Form Interconnect," and issued on February 1, 2005, to inventors Anantha R. Sethuraman and Christopher A. Seams. Invensas owns the entire right, title, and interest in and to the '946 patent.

12. The ’336 patent is entitled “Method of Manufacturing an Electronic Device,” and issued on April 25, 2000, to inventors Hermanus L. Peek and David W. E. Verbugt. Invensas owns the entire right, title, and interest in and to the ’336 patent.

13. The ’167 patent is entitled “PBGA Electrical Noise Isolation of Signal Traces,” and issued on May 20, 2003, to inventors Wee K. Liew, Aritharan Thurairajaratnam, and Nadeem Haque. Invensas owns the entire right, title, and interest in and to the ’167 patent.

14. The ’554 patent is entitled “PBGA Electrical Noise Isolation of Signal Traces,” and issued on November 30, 2004, to inventors Wee K. Liew, Aritharan Thurairajaratnam, and Nadeem Haque. Invensas owns the entire right, title, and interest in and to the ’554 patent.

CLAIMS FOR PATENT INFRINGEMENT

15. The allegations provided below are exemplary and without prejudice to Plaintiff’s infringement contentions provided pursuant to the Court’s scheduling order and local rules. In providing these allegations, Plaintiff does not convey or imply any particular claim constructions or the precise scope of the claims. Plaintiff’s claim construction contentions regarding the meaning and scope of the claim terms will be provided under the Court’s scheduling order and local rules.

16. The accused products include, but are not limited to, Samsung’s Galaxy S6, S7, S8, and Note8 devices. On information and belief, the accused products include infringing processors, memory, and other semiconductor components. *See [In-Depth Look] What’s Inside the Galaxy S8 and S8+*, SAMSUNG GLOBAL NEWSROOM (May 19, 2017), https://news.samsung.com/global/in-depth-look-whats-inside-the-galaxy-s8-and-s8; *Showcase: Latest Smartphones Powered by Samsung Exynos Processor*, SAMSUNG EXYNOS MINISITE, http://www.samsung.com/semiconductor/minisite/Exynos/Showcase/Smartphone/index.html (last visited Sept. 26, 2017). As detailed below, each element of at least one claim of each of the

Asserted Patents is literally present in the accused products. To the extent that any element is not literally present, each such element is present under the doctrine of equivalents.

17. In January 2014, Samsung entered into a Patent License Agreement ("PLA") with Invensas. The PLA expired on December 31, 2016. With this action, Invensas does not seek any damages for any products or components licensed under the PLA, including damages for any such licensed products or components that may have otherwise accrued on or prior to December 31, 2016. Invensas's infringement allegations do not rely on any component licensed under the PLA. In particular, the infringement allegations do not encompass any Samsung-branded components sold on or before the expiration date of the PLA. The infringement allegations also do not encompass any Samsung products or components that continue to be licensed under the PLA.

18. Invensas has also sued Samsung affiliates in the U.S. District Court for the District of Delaware on the '231 and '946 patents ("Delaware Action"). Each Complaint accuses a distinct set of infringing components, and also accuses a different SEC subsidiary of infringement. With respect to the '231 and '946 patents, this Complaint accuses infringing components used, imported, offered for sale, and/or sold within the United States by SEC and SEA. The Complaint in the Delaware Action, in contrast, accuses infringing components manufactured in the United States by SEC and another entity, Samsung Austin Semiconductor, LLC, that are not used, imported, offered for sale, and/or sold in Samsung end products within the United States during the terms of the '231 and '946 patents. Invensas is not seeking, and will not seek, recovery for the same infringing components in both actions. Based on Invensas's present understanding of venue considerations, Invensas is required to file each Complaint in a different judicial district. Invensas has asked Samsung to agree to allow the Delaware Action to be transferred to this District, but Samsung has refused.

COUNT I
INFRINGEMENT OF THE ’231 PATENT

19. Plaintiff incorporates by reference the allegations set forth in paragraphs 1 through 17 as though fully set forth herein.

20. On information and belief, Samsung has infringed and continues to infringe, and/or has induced the infringement of, one or more claims of the ’231 patent, including claim 1 and other claims that depend from claim 1, literally or under the doctrine of equivalents, at least under 35 U.S.C. § 271(g) by importing into the United States and/or offering to sell, selling, and/or using within the United States without authority or license, at least the Samsung Galaxy S6, S7, S8, Note8, Gear S3, solid state drives, memory modules, and other devices containing Exynos processors, Snapdragon SoCs, Universal Flash Storage, Flash Controllers, V-NAND Flash memory, DRAM, SSD Controllers, RF Transceivers, Audio Codecs, Image Processors, Secure NFC Modules, Display Drivers, and other semiconductor chips made in a substantially similar way (collectively, the “’231 Accused Products”), using a process practicing all of the limitations of one or more claims of the ’231 patent.

21. Claim 1 of the ’231 patent recites a “method for providing a substantially planar semiconductor topography which extends above a plurality of electrically conductive features that form an integrated circuit[.]” On information and belief, the ’231 Accused Products include certain semiconductor chips with a substantially planar semiconductor topography that extends above a plurality of electrically conductive features that form an integrated circuit. For example, a cross section of an Exynos processor from the ’231 Accused Products shows a substantially planar layer extending over a layer below that contains a plurality of electrically conductive features that form an integrated circuit.

22. Claim 1 of the ’231 patent requires “etching a plurality of laterally spaced dummy trenches into a dielectric layer between a first trench and a series of second trenches[.]” On information and belief, the ’231 Accused Products include certain semiconductor chips that are made by a process that includes etching a plurality of laterally spaced dummy trenches into a dielectric layer between a first trench and a series of second trenches. For example, in the Exynos application processors of the ’231 Accused Products, there are multiple dummy trenches laterally spaced between a first interconnect and a series of second interconnects, each of which was formed in part by etching trenches into a layer of insulating material.

23. Claim 1 of the ’231 patent further requires that “a lateral dimension of said first trench is greater than a lateral dimension of said second trenches[.]” On information and belief, the lateral dimension of a first trench is greater than a lateral dimension of a series of second trenches (i.e., the first trench is wider than at least one of the second trenches) in certain semiconductor chips of the ’231 Accused Products. For example, in the Exynos application processors of the ’231 Accused Products, a cross section of the first and second trenches shows that the width of the first trench is greater than the width of one or more of the second trenches.

24. Claim 1 of the ’231 patent further requires “filling said dummy trenches and said first and second trenches with a conductive material[.]” On information and belief, in certain semiconductor chips of the ’231 Accused Products, the first, second, and dummy trenches are filled with a conductive material. For example, in the Exynos application processors of the ’231 Accused Products, the first interconnect, second interconnects, and dummy connectors are formed from copper that was filled into trenches etched into the insulating layer.

25. Claim 1 of the ’231 patent further requires “polishing said conductive material to form dummy conductors exclusively in said dummy trenches and interconnect exclusively in said

first and second trenches[.]" On information and belief, in certain semiconductor chips of the '231 Accused Products, the interconnects and dummy conductors are made by a process that includes polishing the conductive material deposited in the first, second, and dummy trenches until the conductive material is exclusively in those trenches (i.e., the conductive material in the first, second, and dummy trenches has been polished such that the copper in the dummy trenches does not connect to the copper in either of the first or second trenches). For example, in the Exynos application processors of the '231 Accused Products, a cross section shows that copper deposited in the dummy trenches has been polished so that it is separate from the copper deposited in the first and second trenches.

26. Claim 1 of the '231 patent further requires "said dummy conductors are electrically separate from said plurality of electrically conductive features and co-planar with said interconnect." On information and belief, in certain semiconductor chips of the '231 Accused Products, the dummy conductors are co-planar with the interconnect and electrically separate from the plurality of electrically conductive features. For example, in the Exynos application processors of the '231 Accused Products, a cross section shows that the upper surfaces of the interconnects are coplanar with the upper surfaces of the dummy conductors, and that the dummy conductors are electrically separate from the active or passive electrical components below the dummy conductors.

27. The infringing semiconductor chips of the '231 Accused Products are neither materially changed by subsequent processes nor become trivial and nonessential components of another product.

28. By at least April 20, 2016, Invensas disclosed the existence of the '231 patent to Samsung and identified, based on information Invensas had obtained independently of Samsung,

at least some of Samsung's activities that infringe the '231 patent. Thus, based on Invensas's disclosure of the '231 patent to Samsung and the fact that discussions regarding the '231 patent and technology licensing occurred, Samsung has had knowledge of the '231 patent and that its activities infringe the '231 patent since at least April 20, 2016. Based on Invensas's disclosures and the fact that discussions regarding the '231 patent and technology licensing occurred, Samsung has also known or should have known since at least April 20, 2016 that its customers, distributors, and other purchasers of the '231 Accused Products are infringing the '231 patent at least because Samsung has known that it is infringing the '231 patent.

29. On information and belief, based solely on Invensas's own information and independent investigation without reliance on any information provided by Samsung, Samsung has continued to use, offer for sale, and/or sell the '231 Accused Products in the United States and/or import the '231 Accused Products into the United States despite its knowledge of the '231 patent and its infringement of that patent. Samsung's infringement has been and continues to be willful.

30. On information and belief, Samsung actively, knowingly, and intentionally induces infringement of one or more claims of the '231 patent under 35 U.S.C. § 271(b) by actively encouraging others to make, use, offer to sell, sell, and/or import '231 Accused Products or products containing the infringing chips of the '231 Accused Products, in this judicial district and elsewhere in the United States. For example, Samsung actively promotes the sale, use, and importation of its infringing chips in marketing materials, technical specifications, data sheets, web pages on its website (e.g., www.samsung.com), press releases, and user manuals, as well as at trade shows (e.g., CES and Mobile World Congress) and through its sales and distribution channels that encourage infringing sales, offers to sell, and importation of the '231 Accused

Products or products containing infringing chips in the ’231 Accused Products. *See, e.g.*, *Showcase: Latest Mobile Devices Powered by Samsung Exynos Processor*, SAMSUNG EXYNOS MINISITE, http://www.samsung.com/semiconductor/minisite/Exynos/Showcase/all/index.html (last visited Sept. 26, 2017); *Application Processor*, SAMSUNG SEMICONDUCTOR GLOBAL WEBSITE, http://www.samsung.com/semiconductor/products/exynos-solution/application-processor (last visited Sept. 26, 2017).

31. Invensas has suffered and continues to suffer damages as a result of Samsung’s infringement of the ’231 patent.

COUNT II
INFRINGEMENT OF THE ’946 PATENT

32. Plaintiff incorporates by reference the allegations set forth in paragraphs 1 through 30 as though fully set forth herein.

33. On information and belief, Samsung has directly infringed and continues to infringe, and/or has induced the infringement of, one or more claims of the ’946 patent, including claim 16 and other claims that depend from claim 16, literally or under the doctrine of equivalents, by making, using, importing, selling, and/or offering to sell in the United States without authority or license, at least the Samsung Galaxy S6, S7, S8, Note8, Gear S3, solid state drives, memory modules, and other devices containing substantially similar Exynos processors, Snapdragon SoCs, Universal Flash Storage, Flash Controllers, V-NAND Flash memory, DRAM, SSD Controllers, RF Transceivers, Audio Codecs, Image Processors, Secure NFC Modules, Display Drivers, and other devices containing substantially similar semiconductor chips (collectively, the “’946 Accused Products”), in violation of 35 U.S.C. § 271.

34. Claim 16 of the ’946 patent recites “[a] substantially planar semiconductor topography[.]” On information and belief, the ’946 Accused Products include a substantially

planar semiconductor topography. For example, in the Exynos processors of the '946 Accused Products, a cross section shows that the upper surfaces of the first trench, plurality of laterally spaced dummy trenches, series of second trenches, and the dielectric layer are substantially planar.

35. Claim 16 of the '946 patent requires "a plurality of laterally spaced dummy trenches in a dielectric layer, between a first trench and a series of second trenches[.]" On information and belief, the '946 Accused Products include semiconductor chips containing a plurality of laterally spaced dummy trenches in a dielectric layer between a first trench and a series of second trenches. For example, in the Exynos processors of the '946 Accused Products, there are multiple laterally spaced dummy trenches in insulating material that are between a first relatively wide trench and a series of second relatively narrow trenches.

36. Claim 16 of the '946 patent further requires that "each of the second trenches is relatively narrow compared to the first trench" and "a lateral dimension of at least one of the laterally spaced dummy trenches is less than a lateral dimension of the first trench and greater than a lateral dimension of at least one of the series of second trenches[.]" On information and belief, the second trenches in certain semiconductor chips of the '946 Accused Products are relatively narrow compared to the first trench (i.e., each of the relatively narrow trenches is narrower than the relatively wide trench), and a lateral dimension of at least one of the laterally spaced dummy trenches is less than a lateral dimension of the first trench and greater than a lateral dimension of at least one of the series of second trenches. For example, in the Exynos processors of the '946 Accused Products, a cross section shows that the width of one or more of the dummy trenches is less than the width of the relatively wide trench, and greater than the width of one or more of the relatively narrow trenches.

37. Claim 16 of the ’946 patent further requires “dummy conductors in said laterally spaced dummy trenches and electrically separate from electrically conductive features below said dummy conductors[.]” On information and belief, in certain semiconductor chips of the ’946 Accused Products, dummy conductors in the laterally spaced dummy trenches are electrically separate from electrically conductive features below the dummy conductors. For example, in the Exynos processors of the ’946 Accused Products, a cross section shows that the copper-based dummy conductors in the dummy trenches are electrically separate from the copper-based conductive lines in the first trench and the series of second trenches, and from active or passive electrical components below the dummy conductors.

38. Claim 16 of the ’946 patent further requires “conductive lines in said series of second trenches and said first trench, wherein upper surfaces of said conductive lines are substantially coplanar with dummy conductor upper surfaces.” On information and belief, the upper surfaces of the conductive lines in certain semiconductor chips of the ’946 Accused Products are substantially coplanar with the dummy conductor upper surfaces. For example, a cross section shows that the upper surfaces of the copper-based interconnects in the Exynos processors of the ’946 Accused Products are substantially coplanar with the upper surfaces of the dummy conductors.

39. The infringing chips of the ’946 Accused Products are neither materially changed by subsequent processes nor become trivial and nonessential components of another product.

40. By at least April 20, 2016, Invensas disclosed the existence of the ’946 patent to Samsung and identified, based on information Invensas had obtained independently of Samsung, at least some of Samsung’s activities that infringe the ’946 patent. Thus, based on Invensas’s disclosure of the ’946 patent to Samsung and the fact that discussions regarding the ’946 patent

and technology licensing occurred, Samsung has had knowledge of the '946 patent and that its activities infringe the '946 patent since at least April 20, 2016. Based on Invensas's disclosures and the fact that discussions regarding the '946 patent and technology licensing occurred, Samsung has also known or should have known since at least April 20, 2016 that its customers, distributors, and other purchasers of the '946 Accused Products are infringing the '946 patent at least because Samsung has known that it is infringing the '946 patent.

41. On information and belief, based solely on Invensas's own information and independent investigation without reliance on any information provided by Samsung, Samsung has continued to use, offer for sale, and/or sell the '946 Accused Products in the United States and/or import the '946 Accused Products into the United States despite its knowledge of the '946 patent and its infringement of that patent. Samsung's infringement has been and continues to be willful.

42. On information and belief, Samsung also actively, knowingly, and intentionally induces infringement of one or more claims of the '946 patent under 35 U.S.C. § 271(b) by actively encouraging others to make, use, offer to sell, sell, and/or import '946 Accused Products or products containing infringing chips in the '946 Accused Products, in this judicial district and elsewhere in the United States. For example, Samsung actively promotes the sale, use, and importation of its infringing chips in marketing materials, technical specifications, data sheets, web pages on its website (e.g., www.samsung.com), press releases, and user manuals, as well as at trade shows (e.g., CES and Mobile World Congress) and through its sales and distribution channels that encourage infringing sales, offers to sell, and importation of the '946 Accused Products or products containing infringing chips in the '946 Accused Products. *See, e.g.*, *Showcase: Latest Mobile Devices Powered by Samsung Exynos Processor*, SAMSUNG EXYNOS

MINISITE, http://www.samsung.com/semiconductor/minisite/Exynos/Showcase/all/index.html (last visited Sept. 26, 2017); *Application Processor*, SAMSUNG SEMICONDUCTOR GLOBAL WEBSITE, http://www.samsung.com/semiconductor/products/exynos-solution/application-processor (last visited Sept. 26, 2017).

43. Invensas has suffered and continues to suffer damages as a result of Samsung's infringement of the '946 patent.

COUNT III
INFRINGEMENT OF THE '336 PATENT

44. Plaintiff incorporates by reference the allegations set forth in paragraphs 1 through 42 as though fully set forth herein.

45. On information and belief, Samsung has infringed and continues to infringe, and/or has induced the infringement of, one or more claims of the '336 patent, including claim 1 and other claims that depend from claim 1, literally or under the doctrine of equivalents, at least under 35 U.S.C. § 271(g) by importing into the United States and/or offering to sell, selling, and/or using within the United States without authority or license, at least the Samsung Galaxy S6, S7, S8, Note8, and other devices containing DRAM memory and/or 10nm FinFET products, and other devices containing substantially similar chips (collectively, the "'336 Accused Products"), where the DRAM memory, 10nm FinFET products, and substantially similar chips are made by a process practicing all of the limitations of one or more claims of the '336 patent.

46. Claim 1 of the '336 patent recites a "method of manufacturing conductor tracks on an electronic device" that requires "providing an electrically insulating substrate[.]" On information and belief, the '336 Accused Products include an electronic device that includes conductor tracks made by a process that includes providing an electrically insulating substrate.

For example, the ’336 Accused Products include LPDDR4 and LPDDR4X DRAM memory that includes bit lines of a memory array provided on a dielectric layer on a silicon-containing substrate.

47. Claim 1 of the ’336 patent requires “providing a conductive layer on the substrate[.]” On information and belief, the LPDDR4 and LPDDR4X DRAM memory in the ’336 Accused Products is made by a process that includes providing a conductive layer on the substrate. For example, the LPDDR4 and LPDDR4X DRAM memory in the ’336 Accused Products includes a conductive tungsten-containing layer on the dielectric layer.

48. Claim 1 of the ’336 patent further requires “forming a conductor pattern on the conductive layer by forming windows at the conductor layer[.]” On information and belief, the LPDDR4 and LPDDR4X DRAM memory in the ’336 Accused Products is made by a process that includes forming a conductor pattern on the conductive layer by forming windows at the conductor layer. For example, the LPDDR4 and LPDDR4X DRAM memory in the ’336 Accused Products includes bitlines formed in the tungsten-containing layer by removing portions of the conductive tungsten-containing layer between the bitlines.

49. Claim 1 of the ’336 patent further requires “the step of forming the windows at the conductor layer comprising: providing a first dielectric layer adjacent the substrate and having a thickness[.]” On information and belief, the LPDDR4 and LPDDR4X DRAM memory in the ’336 Accused Products is made by a process that includes forming windows at the conductor layer by providing a first dielectric layer adjacent the substrate and having a thickness. For example, an insulating hard mask layer was deposited on the substrate in forming the windows at the tungsten-containing layer in the LPDDR4 and LPDDR4X DRAM memory in the ’336 Accused Products.

50. Claim 1 of the ’336 patent further requires “the step of forming the windows at the conductor layer comprising . . . forming auxiliary windows in the first dielectric layer having

dimensions which are greater, in at least one dimension, than the windows to be formed at the conductor layer, the auxiliary windows having sidewalls which define a depth of the auxiliary windows which depth is only part of the thickness of the first dielectric layer[.]" On information and belief, the LPDDR4 and LPDDR4X DRAM memory in the '336 Accused Products is made by a process that includes forming windows at the conductor layer by forming auxiliary windows in the first dielectric layer having dimensions which are greater, in at least one dimension, than the windows to be formed at the conductor layer, the auxiliary windows having sidewalls which define a depth of the auxiliary windows that is only part of the thickness of the first dielectric layer. For example, in forming the windows at the tungsten-containing layer in the LPDDR4 and LPDDR4X DRAM memory in the '336 Accused Products, sacrificial mandrel lines are formed by patterning a top portion of the insulating hard mask layer, where the space between neighboring mandrel lines (an exemplary auxiliary window) is greater than the space between neighboring bit lines, and the height of the sacrificial mandrel lines is less than the thickness of the insulating layer.

51. Claim 1 of the '336 patent further requires "the step of forming the windows at the conductor layer comprising . . . providing an additional dielectric layer on the first dielectric layer including over the auxiliary windows formed in the first dielectric layer[.]" On information and belief, the LPDDR4 and LPDDR4X DRAM memory in the '336 Accused Products is made by a process that includes forming windows at the conductor layer by providing an additional dielectric layer on the first dielectric layer including over the auxiliary windows formed in the first dielectric layer. For example, in forming the windows at the tungsten-containing layer in the LPDDR4 and LPDDR4X DRAM memory in the '336 Accused Products another insulating layer is deposited over the mandrel lines and other remaining portions of the previously-deposited insulating layer.

52. Claim 1 of the ’336 patent further requires “the step of forming the windows at the conductor layer comprising . . . etching the additional dielectric layer back anisotropically without a mask to form spacers on the sidewalls of the auxiliary windows, which spacers are formed by unetched portions of the additional dielectric layer[.]” On information and belief, the LPDDR4 and LPDDR4X DRAM memory in the ’336 Accused Products is made by a process that includes forming windows at the conductor layer by etching the additional dielectric layer back anisotropically without a mask to form spacers on the sidewalls of the auxiliary windows, where the spacers are formed by unetched portions of the additional dielectric layer. For example, in forming the windows at the tungsten-containing layer in the LPDDR4 and LPDDR4X DRAM memory in the ’336 Accused Products, the later-deposited insulating layer is etched to expose a top surface of the mandrel lines, and to form spacers around the mandrel lines from remaining portions of the later-deposited insulating layer.

53. Claim 1 of the ’336 patent further requires “the step of forming the windows at the conductor layer comprising . . . continuing etching anisotropically through the auxiliary window and the spacers to define the windows at the conductive layer.” On information and belief, the LPDDR4 and LPDDR4X DRAM memory in the ’336 Accused Products is made by a process that includes continuing to etch anisotropically through the auxiliary window and the spacers to define the windows at the conductive layer. For example, the LPDDR4 and LPDDR4X DRAM memory in the ’336 Accused Products is made by a process that includes using the spacers as an etching mask, and performing further etching.

54. The infringing chips of the ’336 Accused Products are neither materially changed by subsequent processes nor become trivial and nonessential components of another product.

55. By at least April 20, 2016, Invensas disclosed the existence of the ’336 patent to Samsung and identified, based on information Invensas had obtained independently of Samsung, at least some of Samsung’s activities that infringe the ’336 patent. Thus, based on Invensas’s disclosure of the ’336 patent to Samsung and the fact that discussions regarding the ’336 patent and technology licensing occurred, Samsung has had knowledge of the ’336 patent and that its activities infringe the ’336 patent since at least April 20, 2016. Based on Invensas’s disclosures and the fact that discussions regarding the ’336 patent and technology licensing occurred, Samsung has also known or should have known since at least April 20, 2016 that its customers, distributors, and other purchasers of the ’336 Accused Products are infringing the ’336 patent at least because Samsung has known that it is infringing the ’336 patent.

56. On information and belief, based solely on Invensas’s own information and independent investigation without reliance on any information provided by Samsung, Samsung has continued to make, use, offer for sale, and/or sell the ’336 Accused Products in the United States and/or import the ’336 Accused Products into the United States despite its knowledge of the ’336 patent and its infringement of that patent. Samsung’s infringement has been and continues to be willful.

57. On information and belief, Samsung actively, knowingly, and intentionally induces infringement of one or more claims of the ’336 patent under 35 U.S.C. § 271(b) by actively encouraging others to make, use, offer to sell, sell, and/or import ’336 Accused Products or products containing infringing chips in the ’336 Accused Products, in this judicial district and elsewhere in the United States. For example, Samsung actively promotes the sale, use, and importation of its infringing chips in marketing materials, technical specifications, data sheets, web pages on its website (e.g., www.samsung.com), press releases, and user manuals, as well as

at trade shows (e.g., CES and Mobile World Congress) and through its sales and distribution channels that encourage infringing sales, offers to sell, and importation of the ’336 Accused Products or products containing infringing chips in the ’336 Accused Products. *See, e.g., [In-Depth Look] What’s Inside the Galaxy S8 and S8+*, SAMSUNG GLOBAL NEWSROOM (May 19, 2017), https://news.samsung.com/global/in-depth-look-whats-inside-the-galaxy-s8-and-s8; *Mobile DRAM*, SAMSUNG SEMICONDUCTOR GLOBAL WEBSITE, http://www.samsung.com/semiconductor/products/dram/mobile-dram/ (last visited Sept. 26, 2017).

58. Invensas has suffered and continues to suffer damages as a result of Samsung’s infringement of the ’336 patent.

COUNT IV
INFRINGEMENT OF THE ’167 PATENT

59. Plaintiff incorporates by reference the allegations set forth in paragraphs 1 through 56 as though fully set forth herein.

60. On information and belief, Samsung has infringed and continues to infringe, and/or has induced the infringement of, one or more claims of the ’167 patent, including claim 1 and other claims that depend from claim 1, literally or under the doctrine of equivalents, at least under 35 U.S.C. § 271(g) by importing into the United States and/or offering to sell, selling, and/or using within the United States without authority or license, at least the Samsung Galaxy S7, S8, Note8, and other devices containing the C3S5A0C02 image processor, Samsung solid state drives containing V-NAND Flash memory and/or LPDDR3 DRAM, and other devices containing substantially similar semiconductor chips (collectively, the “’167 Accused Products”), where the C3S5A0C02 image processor, V-NAND Flash memory, LPDDR3 DRAM, and other substantially

similar semiconductor chips therein are made by a process practicing all of the limitations of one or more claims of the ’167 patent.

61. Claim 1 of the ’167 patent recites “[a] method for fabricating a semiconductor package[.]” On information and belief, the accused components of the ’167 Accused Products are semiconductor packages fabricated using a method of manufacture. For example, the C3S5A0C02 image processor from the Samsung Galaxy S8 is a semiconductor package that includes an integrated circuit mounted a package substrate.

62. Claim 1 of the ’167 patent requires “providing a 2-layer semiconductor substrate, the 2-layer substrate including a top layer and a bottom layer wherein the bottom layer includes an array of solder balls.” On information and belief, the ’167 Accused Products include certain semiconductor chips that are made by a process that includes providing a two-layer semiconductor substrate with a top layer and a bottom layer, where the bottom layer includes an array of solder balls. For example, the C3S5A0C02 image processor from the Samsung Galaxy S8 includes a package substrate within has two layers, top and bottom, and the bottom layer of that package substrate includes solder balls arranged in a 10x10 grid.

63. Claim 1 of the ’167 patent further requires “patterning signal traces on the top layer[.]” On information and belief, certain semiconductor chips of the ’167 Accused Products are made by a process that includes patterning the top layer of a two-layer semiconductor substrate with signal traces. For example, in the C3S5A0C02 image processor from the Samsung Galaxy S8, the top layer of the package substrate of is patterned with a plurality of signal traces.

64. Claim 1 of the ’167 patent further requires “identifying groups of signal traces to isolate[.]” On information and belief, certain semiconductor chips of the ’167 Accused Products are made by a process that includes identifying groups of signal traces to isolate. For example, in

the C3S5A0C02 image processor from the Samsung Galaxy S8, the layout of the top layer of the package substrate includes at least two groups of signal traces that are isolated by an adjacent grounded isolation trace, which is indicative of a fabrication method that includes identifying groups of signal traces to isolate.

65. Claim 1 of the ’167 patent further requires “patterning a grounded isolation trace adjacent to one of the groups of traces to isolate the signal traces and thereby provide noise shielding[.]” On information and belief, certain semiconductor chips of the ’167 Accused Products are made by a process that includes patterning a grounded isolation trace such that it is adjacent to a group of signal traces and provides noise shielding to those signal traces. For example, in the C3S5A0C02 image processor from the Samsung Galaxy S8, the top layer of the package substrate includes a ground trace placed immediately next to a group of signal traces, which is indicative of a shield that reduces electrical noise for that group of signal traces.

66. Claim 1 of the ’167 patent further requires “identifying a row of solder balls to be grounded[.]” On information and belief, certain semiconductor chips of the ’167 Accused Products are made by a process that includes identifying a row of solder balls to be grounded. For example, in the C3S5A0C02 image processor of the Samsung Galaxy S8, the layout of the bottom layer of the package substrate from includes a row of at least three solder balls that are connected to each other and to an input ground signal, which is indicative of a fabrication method that includes identifying a row of solder balls to be grounded.

67. Claim 1 of the ’167 patent further requires “connecting the row of solder balls together and to ground to create a bottom-layer isolating ground trace.” On information and belief, certain semiconductor chips of the ’167 Accused Products are made by a process that includes connecting the row of solder balls together and to ground to create a bottom-layer isolating ground

trace. For example, the bottom layer of the package substrate from the C3S5A0C02 image processor from the Samsung Galaxy S8 includes a row of at least three solder balls that are connected to each other and to an input ground signal.

68. The infringing semiconductor chips of the ’167 Accused Products are neither materially changed by subsequent processes nor become trivial and nonessential components of another product.

69. By at least April 20, 2016, Invensas disclosed the existence of the ’167 patent to Samsung and identified, based on information Invensas had obtained independently of Samsung, at least some of Samsung’s activities that infringe the ’167 patent. Thus, based on Invensas’s disclosure of the ’167 patent to Samsung and the fact that discussions regarding the ’167 patent and technology licensing occurred, Samsung has had knowledge of the ’167 patent and that its activities infringe the ’167 patent since at least April 20, 2016. Based on Invensas’s disclosures and the fact that discussions regarding the ’167 patent and technology licensing occurred, Samsung has also known or should have known since at least April 20, 2016 that its customers, distributors, and other purchasers of the ’167 Accused Products are infringing the ’167 patent at least because Samsung has known that it is infringing the ’167 patent.

70. On information and belief, based solely on Invensas’s own information and independent investigation without reliance on any information provided by Samsung, Samsung has continued to make, use, offer for sale, and/or sell the ’167 Accused Products in the United States and/or import the ’167 Accused Products into the United States despite its knowledge of the ’167 patent and its infringement of that patent. Samsung’s infringement has been and continues to be willful.

71. On information and belief, Samsung actively, knowingly, and intentionally induces infringement of one or more claims of the ’167 patent under 35 U.S.C. § 271(b) by actively encouraging others to make, use, offer to sell, sell, and/or import ’167 Accused Products or products containing infringing chips in the ’167 Accused Products, in this judicial district and elsewhere in the United States. For example, Samsung actively promotes the sale, use, and importation of its infringing chips in marketing materials, technical specifications, data sheets, web pages on its website (e.g., www.samsung.com), press releases, and user manuals, as well as at trade shows (e.g., CES and Mobile World Congress) and through its sales and distribution channels that encourage infringing sales, offers to sell, and importation of the ’167 Accused Products or products containing infringing chips in the ’167 Accused Products. *See, e.g., [In-Depth Look] What’s Inside the Galaxy S8 and S8+*, SAMSUNG GLOBAL NEWSROOM (May 19, 2017), https://news.samsung.com/global/in-depth-look-whats-inside-the-galaxy-s8-and-s8; *[In-Depth Look] Fast, Fun and In-Focus: The Galaxy S8 Camera*, SAMSUNG GLOBAL NEWSROOM (Mar. 30, 2017), https://news.samsung.com/global/in-depth-look-fast-fun-and-in-focus-the-galaxy-s8-camera (discussing enhanced image processing).

72. Invensas has suffered and continues to suffer damages as a result of Samsung’s infringement of the ’167 patent.

COUNT V
INFRINGEMENT OF THE ’554 PATENT

73. Plaintiff incorporates by reference the allegations set forth in paragraphs 1 through 70 as though fully set forth herein.

74. On information and belief, Samsung has directly infringed and continues to infringe, and/or has induced the infringement of, one or more claims of the ’554 patent, including claim 1 and other claims that depend from claim 1, literally or under the doctrine of equivalents,

by making, using, importing, selling, and/or offering to sell in the United States without authority or license, at least the Samsung Galaxy S7, S8, Note8 and other devices containing the C3S5A0C02 image processor, Samsung solid state drives containing V-NAND Flash memory and/or LPDDR3 DRAM, and other devices containing substantially similar semiconductor chips (collectively, the "'554 Accused Products"), in violation of 35 U.S.C. § 271.

75. Claim 1 of the '554 patent recites "[a] package substrate having noise control[.]" On information and belief, certain semiconductor chips of the '554 Accused Products include a package substrate having noise control. For example, the C3S5A0C02 image processor from the Samsung Galaxy S8 includes an integrated circuit mounted a package substrate that has noise control features, including ground traces placed adjacent to signal traces.

76. Claim 1 of the '554 patent requires that the package substrate comprise "at most two layers[.]" On information and belief, certain semiconductor chips of the '554 Accused Products include a package substrate with at most two layers. For example, the C3S5A0C02 image processor from the Samsung Galaxy S8 includes a package substrate with exactly two layers: a top layer with signal traces, and a bottom layer with solder ball connections.

77. Claim 1 of the '554 patent further requires that the package substrate include "a plurality of signal traces on a first layer[.]" On information and belief, certain semiconductor chips of the '554 Accused Products include a package substrate with a plurality of signal traces on a first layer. For example, in the C3S5A0C02 image processor from the Samsung Galaxy S8, the package substrate includes multiple signal traces patterned on its top layer.

78. Claim 1 of the '554 patent further requires that the package substrate include "at least one isolating ground trace on the first layer between two signal traces to provide noise shielding[.]" On information and belief, certain semiconductor chips of the '554 Accused Products

include a first layer with at least one isolating ground trace positioned between two signal traces such that the ground trace provides noise shielding to those traces. For example, in the C3S5A0C02 image processor from the Samsung Galaxy S8, the top layer of the package substrate includes a ground trace positioned between and immediately adjacent to two signal traces, which is indicative of the ground trace providing electrical noise shielding to the signal traces.

79. Claim 1 of the ’554 patent further requires that the package substrate include “an array of solder balls on a second layer such that at least one row of solder balls is connected together and to ground to create a second-layer isolating ground trace.” On information and belief, certain semiconductor chips of the ’554 Accused Products include a second layer with an isolating ground trace formed from an array of solder balls by connecting at least one row of the solder balls together and to ground. For example, in the C3S5A0C02 image processor from the Samsung Galaxy S8, the bottom layer of the package substrate includes a 10x10 grid of solder balls, and a row of at least three of those solder balls is connected together and to an input ground signal.

80. By at least April 20, 2016, Invensas disclosed the existence of the ’554 patent to Samsung and identified, based on information Invensas had obtained independently of Samsung, at least some of Samsung’s activities that infringe the ’554 patent. Thus, based on Invensas’s disclosure of the ’554 patent to Samsung and the fact that discussions regarding the ’554 patent and technology licensing occurred, Samsung has had knowledge of the ’554 patent and that its activities infringe the ’554 patent since at least April 20, 2016. Based on Invensas’s disclosures, and the fact that discussions regarding the ’554 patent and technology licensing occurred, Samsung has also known or should have known since at least April 20, 2016 that its customers, distributors, and other purchasers of the ’554 Accused Products are infringing the ’554 patent at least because Samsung has known that it is infringing the ’554 patent.

81. On information and belief, based solely on Invensas's own information and independent investigation without reliance on any information provided by Samsung, Samsung has continued to make, use, offer for sale, and/or sell the '554 Accused Products in the United States and/or import the '554 Accused Products into the United States despite its knowledge of the '554 patent and its infringement of that patent. Samsung's infringement has been and continues to be willful.

82. On information and belief, Samsung also actively, knowingly, and intentionally induces infringement of one or more claims of the '554 patent under 35 U.S.C. § 271(b) by actively encouraging others to make, use, offer to sell, sell, and/or import '554 Accused Products or products containing infringing chips in the '554 Accused Products, in this judicial district and elsewhere in the United States. For example, Samsung actively promotes the sale, use, and importation of its infringing chips in marketing materials, technical specifications, data sheets, web pages on its website (e.g., www.samsung.com), press releases, and user manuals, as well as at trade shows (e.g., CES and Mobile World Congress) and through its sales and distribution channels that encourage infringing sales, offers to sell, and importation of the '554 Accused Products or products containing infringing chips in the '554 Accused Products. *See, e.g.*, *[In-Depth Look] What's Inside the Galaxy S8 and S8+*, SAMSUNG GLOBAL NEWSROOM (May 19, 2017), https://news.samsung.com/global/in-depth-look-whats-inside-the-galaxy-s8-and-s8; *[In-Depth Look] Fast, Fun and In-Focus: The Galaxy S8 Camera*, SAMSUNG GLOBAL NEWSROOM (Mar. 30, 2017), https://news.samsung.com/global/in-depth-look-fast-fun-and-in-focus-the-galaxy-s8-camera (discussing enhanced image processing).

83. Invensas has suffered and continues to suffer damages as a result of Samsung's infringement of the '554 patent.

JURY DEMAND

84. Plaintiff demands a jury trial as to all issues that are triable by a jury in this action.

PRAYER FOR RELIEF

WHEREFORE, Plaintiff respectfully prays for relief as follows:

(a) Judgment that each defendant is liable for infringement and/or inducing the infringement of one or more claims of each of the Asserted Patents;

(b) Compensatory damages in an amount according to proof, and in any event no less than a reasonable royalty;

(c) Treble damages for willful infringement pursuant to 35 U.S.C. § 284;

(d) Pre-judgment interest;

(e) Post-judgment interest;

(f) Attorneys' fees based on this being an exceptional case pursuant to 35 U.S.C. § 285, including pre-judgment interest on such fees;

(g) An accounting and/or supplemental damages for all damages occurring after any discovery cutoff and through final judgment;

(h) Costs and expenses in this action; and

(i) Any further relief that the Court deems just and proper.

Dated: February 18, 2018

/s/ Matthew J. Moore w/permission Claire Henry

Matthew J. Moore
E-mail: Matthew.Moore@lw.com
Lawrence J. Gotts
E-mail: Lawrence.Gotts@lw.com
Alan M. Billharz
E-mail: Alan.Billharz@lw.com
David A. Zucker
E-mail: David.Zucker@lw.com
LATHAM & WATKINS LLP
555 Eleventh Street, NW Suite 1000

Washington, DC 20004-1304
(202) 637-2200

Maximilian A. Grant
E-mail: Max.Grant@lw.com
Clement J. Naples
E-mail: Clement.Naples@lw.com
LATHAM & WATKINS LLP
885 Third Avenue
New York, NY 10022-4834
(212) 906-1200

Amit Makker
E-mail: Amit.Makker@lw.com
Brian W. Lewis (pro hac vice)
E-mail: Brian.W.Lewis@lw.com
LATHAM & WATKINS LLP
505 Montgomery Street, Suite 2000
San Francisco, CA 94111
Tel: 415-391-0600
Fax: 415-395-8095

T. John Ward
Texas State Bar No. 20848000
E-mail: tjw@wsfirm.com
Claire Abernathy Henry
Texas State Bar No. 24053063
E-mail: claire@wsfirm.com
Andrea Fair
Texas State Bar No. 24078488
E-mail: andrea@wsfirm.com
WARD, SMITH & HILL, PLLC
PO Box 1231
Longview, Texas 75606-1231
(903) 757-6400 (telephone)
(903) 757-2323 (facsimile)

Attorneys for Plaintiff Invensas Corporation

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CERTIFICATE OF SERVICE

I hereby certify that a copy of the foregoing document was filed electronically in compliance with Local Rule CV-5(a). Therefore, this document was served on all counsel who are deemed to have consented to electronic service. Local Rule CV-5(a)(3)(A). Pursuant to Fed. R. Civ. P. 5(d) and Local Rule CV-5(d) and (e), all other counsel of record not deemed to have consented to electronic service were served with a true and correct copy of the foregoing by email on February 16, 2018.

/s/ Claire Henry